75WS2 ALIGNMENT INSTRUCTION

1.0 TEST CONDITION:

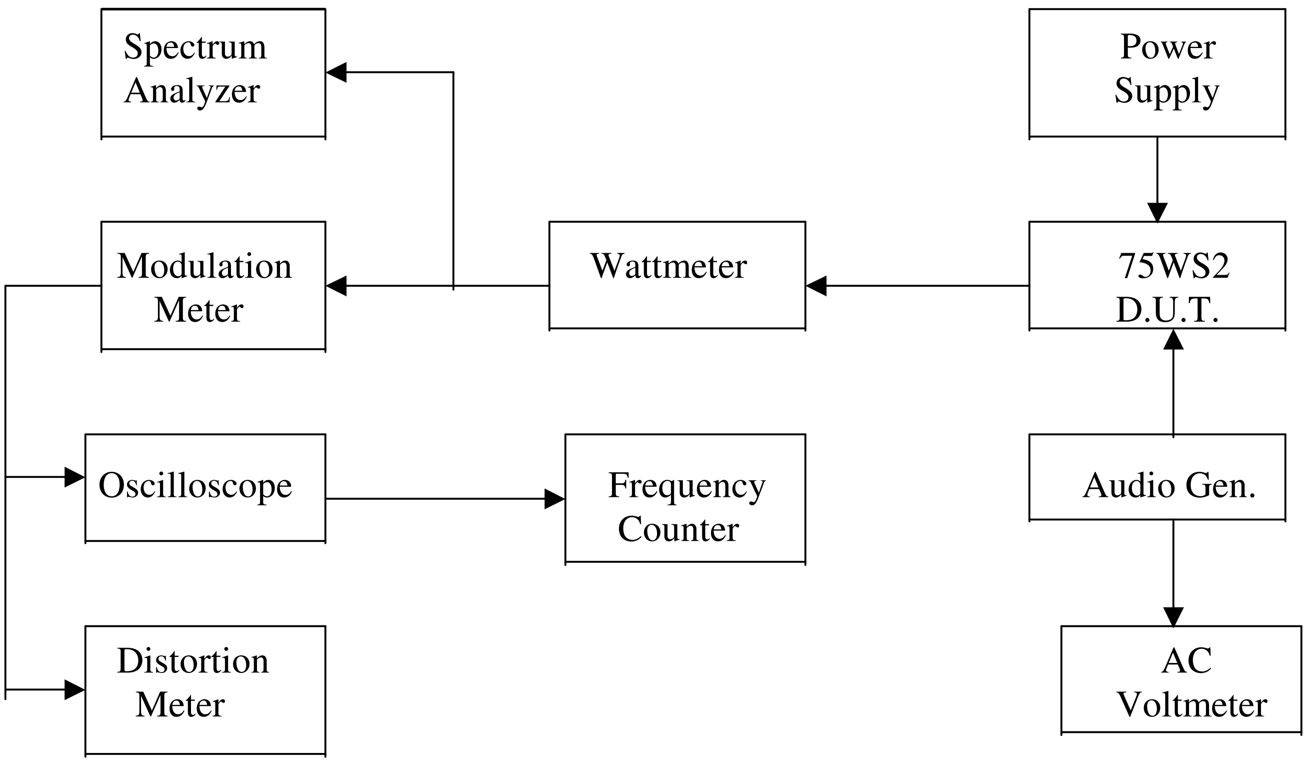
1.1. STANDARD DC POWER:	EXT.DC	13.8VDC
1.2. MEASUREMENT CHANNEL:	CB	CH19 (27.185MHz)
	WX	CH3 (162.475MHz)
1.3. STANDARD AUDIO LOADING:	CB/WX	8 Ω
1.4. ANTENNA IMPEDANCE:	CB/WX	50 Ω
1.5. STANDARD REF. MODULATION:	CB	30% (AM)
	WX	± 3KHz (FM)
1.6. STANDARD REF. AUDIO OUTPUT:	CB/WX	0.05W

1.7. FREQUENCY TABLE

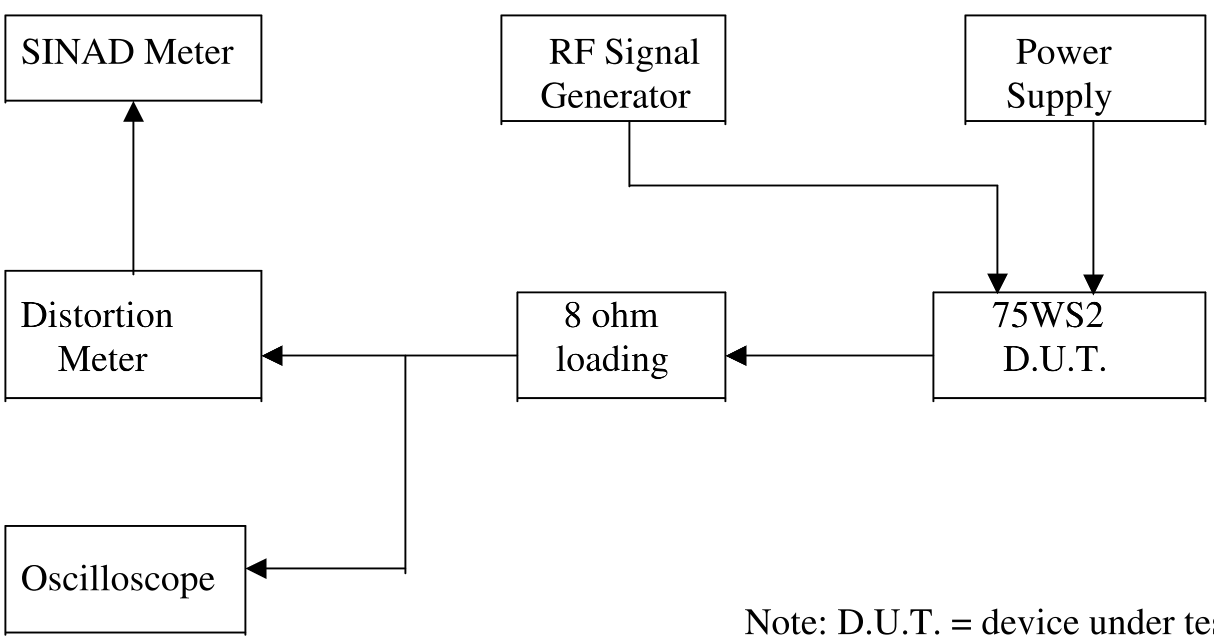
CB BAND		WX BAND	
CH NO.	FREQ. (MHz)	CH NO.	FREQ. (MHz)
01	26.965	1	162.550
02	26.975	2	162.400
03	26.985	3	162.475
04	27.005	4	162.425
05	27.015	5	162.450
06	27.025	6	162.500
07	27.035	7	162.525
08	27.055	8	161.650
09	27.065	9	161.775
10	27.075	10	163.275
11	27.085		
12	27.105		
13	27.115		
14	27.125		
15	27.135		
16	27.155		
17	27.165		
18	27.175		
19	27.185		
20	27.205		
21	27.215		
22	27.225		
23	27.255		
24	27.235		
25	27.245		
26	27.265		
27	27.275		
28	27.285		
29	27.295		
30	27.305		
31	27.315		
32	27.325		
33	27.335		
34	27.345		
35	27.355		
36	27.365		
37	27.375		
38	27.385		
39	27.395		
40	27.405		

1.8. TEST EQUIPMENT SETUP AS BELOW:

A. TX test equipment setup:



B. RX test equipment setup:



Note: D.U.T. = device under test

2.0 ALIGNMENT

2.1 VCO ALIGNMENT

TEST ITEM	TEST CONDITION & PROCEDURE	PURPOSE
1. CB VCO Voltage	1. Connect a digital multi-meter to TP1 2. Set CB RX mode: CH1.	Adjust **L11** for 1.0 ± 0.1 V.
	3. Set CB TX mode	Check CH40 ≤ 4.5V.
2. WX VCO Voltage	1. Connect a digital multi-meter to TP1 2. Set WX mode CH08.	Adjust **L1** FOR 1.5 ± 0.1V. Check CH1 0 ≤ 3.0V.

2.2 WX RECEIVER

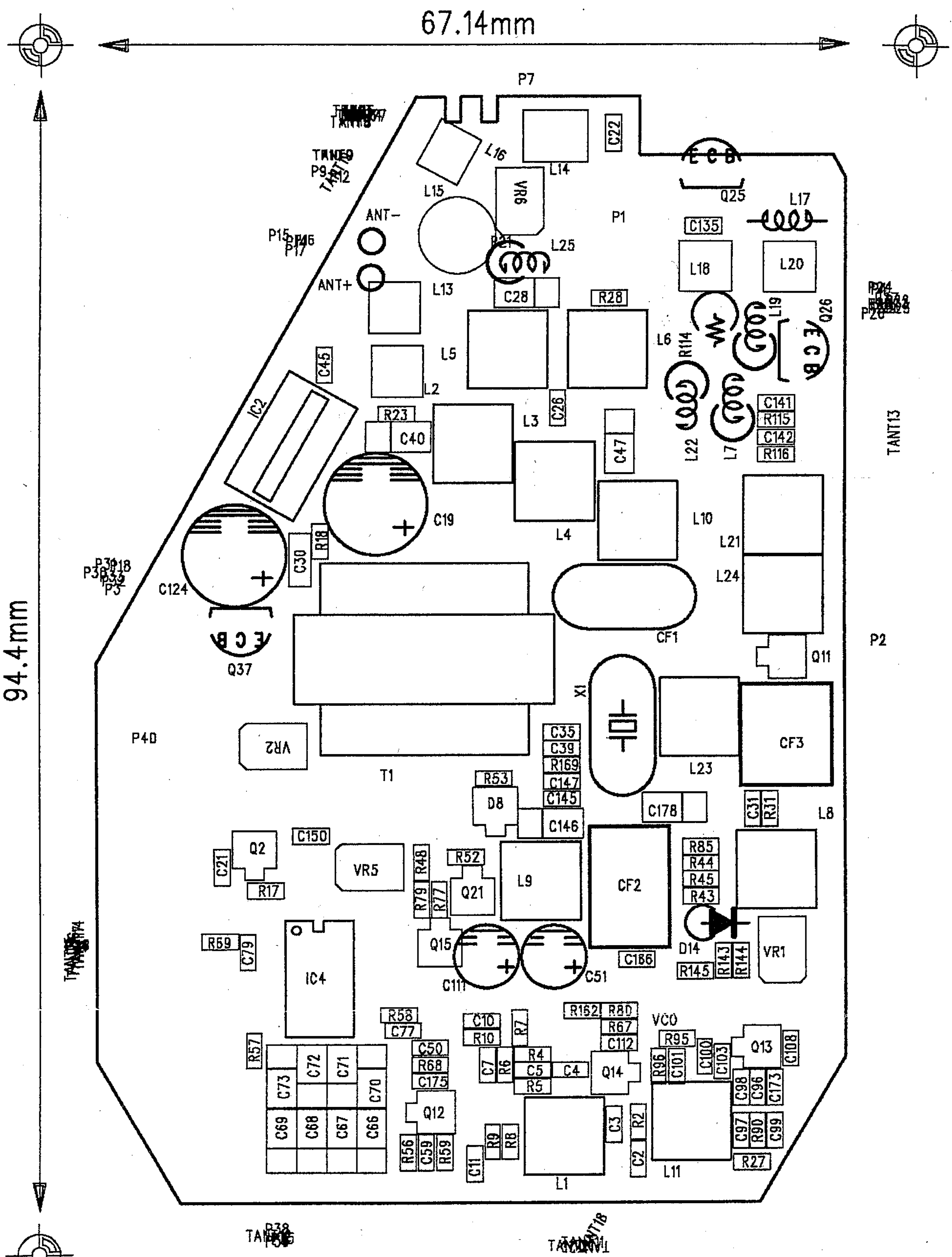
TEST ITEM	TEST CONDITION & PROCEDURE	PURPOSE
1. Audio output level	1.Set WX mode, CH3. 2.Output of signal generator thru a 0.01µF to TP3. 3.RF Gen. set 10.7MHz, Fmod= 1KHz, Dev.= ± 3KHz, RF level: 1mV. 4.Set volume control to middle position.	1. Adjust **L9** for maximum audio output & minimum distortion at the distortion meter.(Distortion less than 8%) 2. Set volume control to maximum position, audio power output shall be more than 0.3 Watts.
2. WX sensitivity	1.Output of signal generator to antenna input terminal. 2. RF Gen. set 162.475MHz, Fmod= 1KHz, Dev.= ± 3KHz, RF level: 1µV. 3. WX set CH3.	1.Adjust **L4** and **L3** for more than 12dB at the SINAD meter. 2.Repeat as needed. Check all channels sens. must met D.T.S.

2.3 CB Receiver Alignment

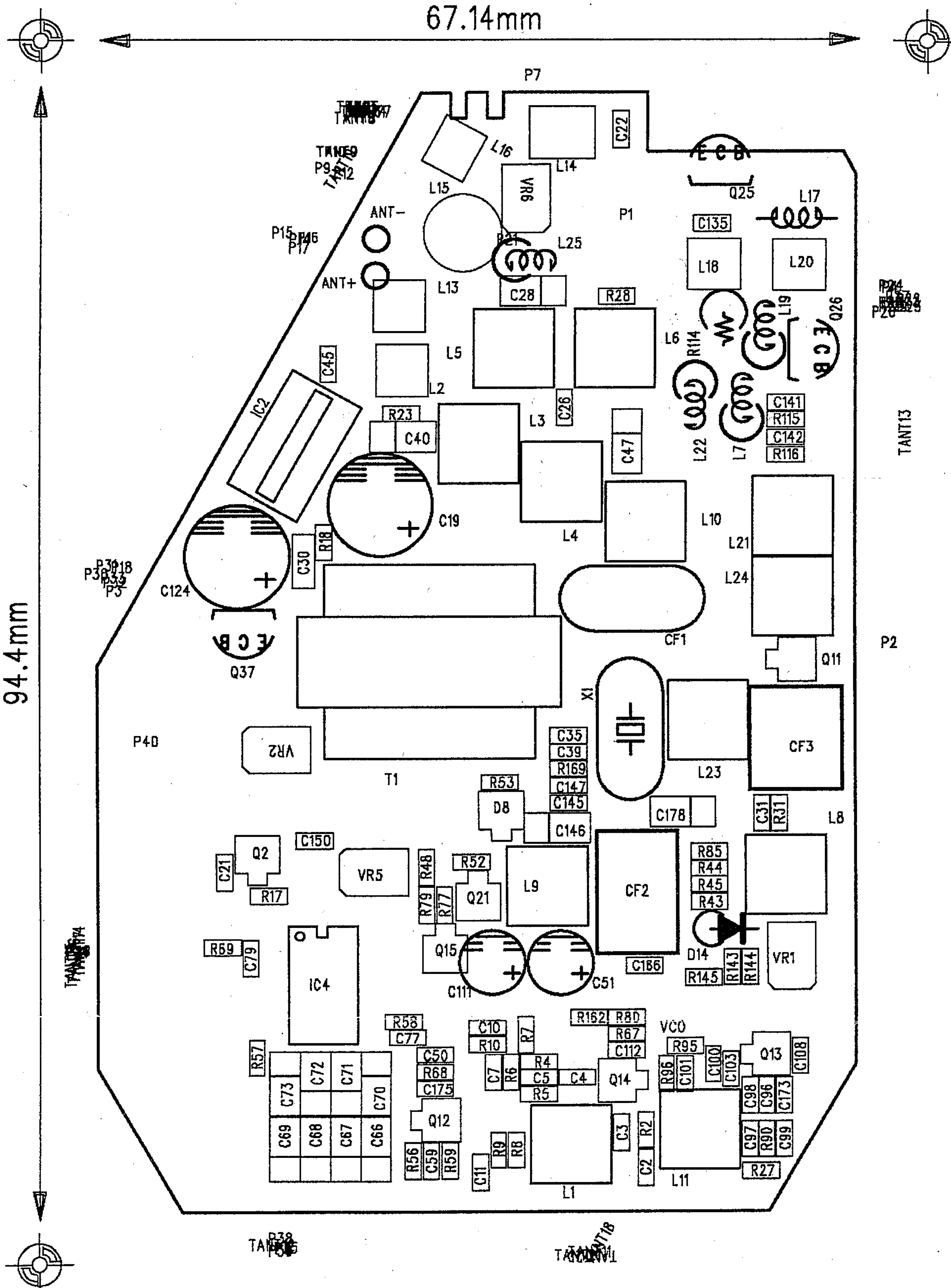
TEST ITEM	TEST CONDITION & PROCEDURE	PURPOSE
1. Audio output level	1. CB RX mode. 2. ST to OFF 3. Output of signal generator thru 0.01uF to TP3. 4. RF Gen. set 10.7MHz, Fmod= 1KHz, AM= 30%, level: 1mV. 5. Set Volume control to middle position. 6. Set Squelch to minimum.	1. Adjust **L8** and **L23** for maximum audio output & minimum distortion at the distortion meter.(Distortion less than 5%) 2. Set volume control to maximum position, audio power output shall be more than 0.35 Watts.
2. RX sensitivity	1. Set normal band CH19. 2. Output of signal generator to antenna input terminal. 3. RF Gen. set 27.185MHz, fm: 1kHz, AM= 30%, RF level: 1µV.	1. Adjust **L5, L6** and **L10** for more than 10dB S/N ratio. 2. Repeat as needed. Check CH1 and CH40.
3. SQUELCH control (Tight Squelch)	1. Set normal band CH19. 2.Output of signal generator to the antenna input terminal. 3. RF Gen. set 27.185 MHz , Fmod= 1KHz, AM= 30%, RF level: 2000 µV. 4. Rotate the Squelch control to fully clockwise position	1.Slowly turn **VR5** to a position that the audio output waveform at the oscilloscope just appears from no output. 2.Must open at 4000uV. 3.Must not open at 800uV.
4. Signal meter display	1. Set normal band CH19. 2. Output of signal generator to antenna input terminal. RF Gen. set 27.185MHz, no modulation, RF level: 100 µV.	1. Adjust **VR1** for "9" displayed on the signal meter of LCD . 2. Increase RF level by 30dB. The signal meter should be displayed at "+30" position.
5. Sound Tracker (ST must be on) a) S/N b) Audio Gain	1. Set normal band CH19. 2. RF Gen. set 27.185MHz,30% modulation 3. S/N @ RF level 1.0uV @ RF level 1000uV 4. Audio Gain @ 100uV 50% Mod.	1. S/N: 1.0uV ≥ 15dB. 1000uV ≥ 50dB. 2. ST audio output change 2-8dB from OFF to ON.

2.4 CB Transmitter Alignment

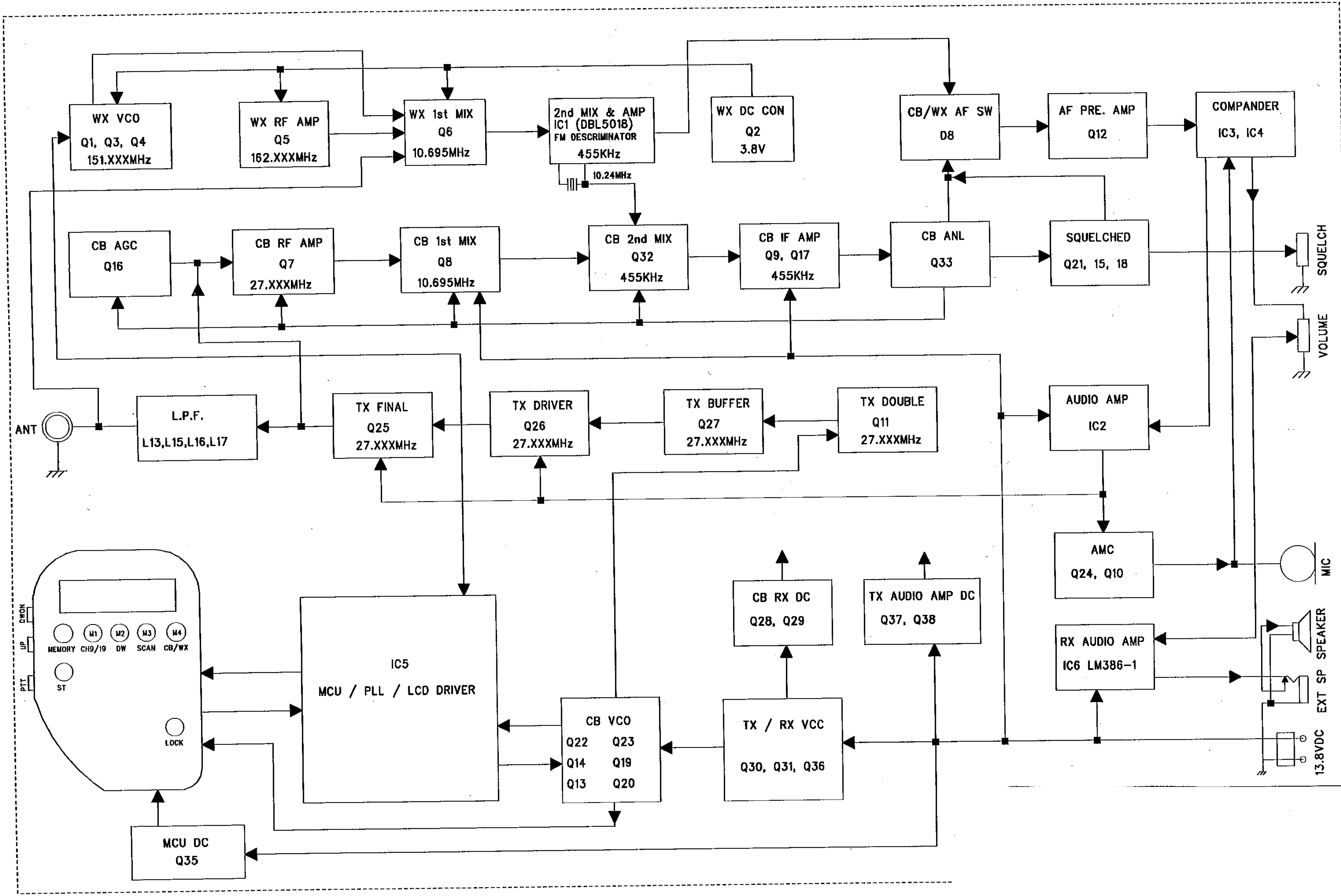
TEST ITEM	TEST CONDITION & PROCEDURE	PURPOSE
1. TP4 Alignment	1. Channel set normal band CH 19. 2. Set TX mode. Connect the TP4 thru a 10pF capacitor to the oscilloscope.	1. Adjust L24,L21for maximum RF output waveform on the scope. (Freq. = 27.185MHz) 2. Repeat as needed.
2. TX Carrier output power	1. Channel set normal band CH 19. 2. Set TX mode. 3. Connect an RF wattmeter to the antenna socket.	1. Adjust**L14** for 4.0 watts RF output power. 2. Check TX CH1 and CH40 should meet D.T.S.
3.TX Carrier frequency detector.	1. Channel set CH 19. 2. Set TX mode.	Turn vc1 for 27.185MHz ± 300Hz at the frequency counter.
4. TX Signal meter	1. Connect an RF wattmeter to the antenna socket. 2. No modulation. 3. Set TX output power for 3watts.	Adjust **VR6** for "3" displayed at the TX signal strength of the LCD.
5. MAXIMUM Modulation (AMC control)	1. Set TX mode. Output of AF generator to MIC jack, @ 1000Hz, 25 mV . ST set off.	1.Adjust **VR2** for 88% modulation. 2.Distortion less than 8.0% at 80% modulation. 3. Check CH1,CH40.
6. TX 2nd harmonics	1. Connect an RF wattmeter to the antenna socket.	Reading 2nd harmonics must less than -60dB at spectrum analyzer.
7. Occupied band width, (OBW)	1.Set TX High power mode 2.Set modulation frequency 2500 Hz. 3.6mv.	The frequency spectrum of the harmonics should be at least 2 dB better than the limits of the FCC specification.



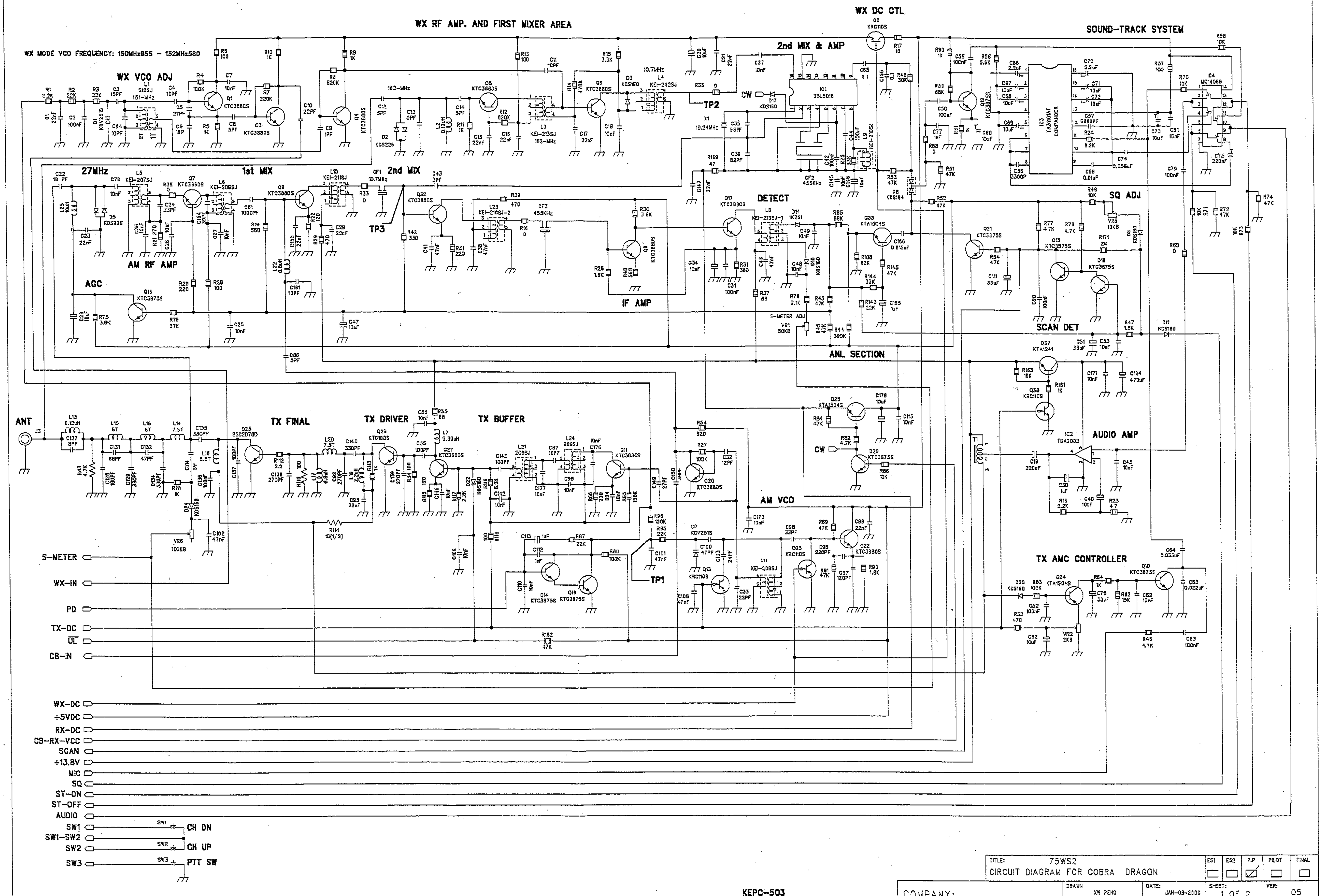
67.14mm
94.4mm
P7
L16
L14
C22
Q25
L15
VR6
P1
L17
ANT-
ANT+
C135
L25
L18
L20
L13
C28
R28
Q26
L19
L5
L6
R114
C45
L2
IC2
C141
R115
C142
R116
R23
C40
L3
C26
C47
L22
L7
TANT13
C19
L4
L10
L21
C124
C30
R18
L24
CF1
Q37
P2
Q11
X1
P40
VR2
T1
C35
C39
R169
C147
C145
C146
R53
D8
L23
CF3
C178
C31
R31
L8
Q2
C150
C21
R17
VR5
R48
R52
Q21
R79
R77
L9
CF2
R85
R44
R45
R43
D14
VR1
R69
C79
IC4
Q15
C111
C51
C166
R143
R144
R145
R58
C77
C10
R10
R7
R162
R80
R67
C112
VCO
R95
Q13
C108
R57
C73
C72
C71
C70
C50
R68
C175
C7
R6
R4
C5
R5
C4
Q14
R96
C101
C100
C103
C98
C96
C173
Q12
C69
C68
C67
C66
R56
C59
R59
C11
R9
R8
L1
C3
R2
C2
L11
C97
R90
C99
R27

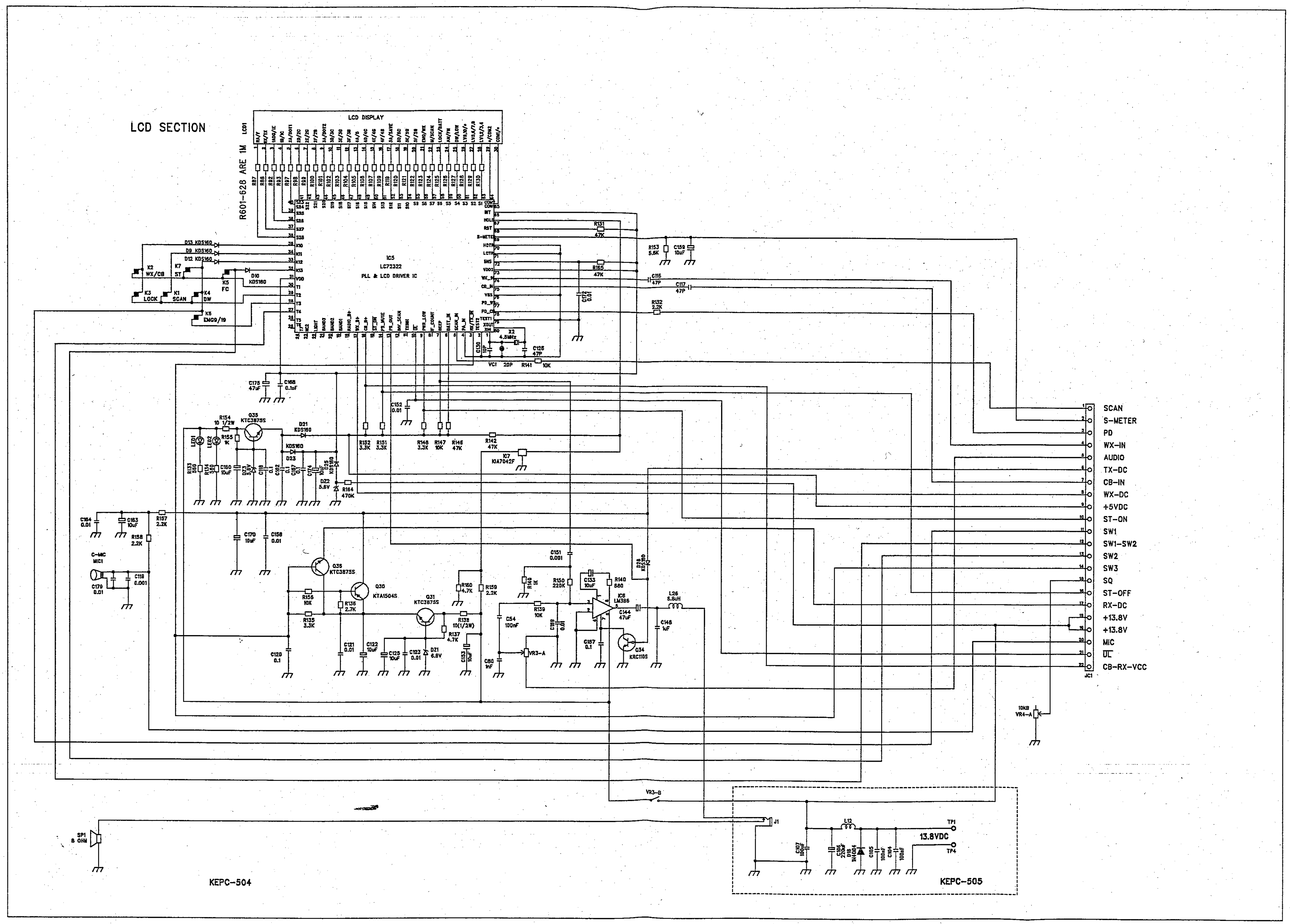

67.14mm
94.4mm
P7
L16
L14
C22
E C B
Q25
L17
P1
C135
L18
L20
L15
VR6
L25
ANT-
ANT+
L13
C28
R28
L6
R114
L19
Q26
L5
C45
L2
IC2
R23
C40
L3
C26
C47
L22
L7
C141
R115
C142
R116
TANT13
C19
L4
L10
L21
L24
C30
R18
C124
Q37
CF1
Q11
P2
X1
P40
VR2
T1
C35
C39
R169
C147
C145
C146
R53
D8
C178
L23
CF3
C31
R31
L8
C150
Q2
C21
R17
VR5
R48
R52
Q21
L9
CF2
R85
R44
R45
R43
R79
R77
D14
VR1
C79
IC4
Q15
C111
C51
C186
R145
R143
R144
R58
C77
C10
R10
R7
R162
R80
R67
C112
VCO
R95
C100
C103
Q13
C108
R96
C101
R57
C72
C71
C73
C70
C50
R68
C175
C7
R6
R4
C5
C4
R5
Q14
C98
C96
C173
Q12
C69
C68
C67
C66
R56
C59
R59
R9
R8
C3
R2
C11
C2
L1
L11
C97
R90
C99
R27

CB 75WX ST II BLOCK DIAGRAM FOR COBRA



CIRCUIT DIAGRAM FOR COBRA DRAGON




LCD SECTION
LCD DISPLAY
R601-628 ARE 1M
IC5
LC72322
PLL & LCD DRIVER IC
IC7
KIA7042F
IC8
LM386
C-MIC
MIC1
SP1
8 OHM
SCAN
S-METER
PD
WX-IN
AUDIO
TX-DC
CB-IN
WX-DC
+5VDC
ST-ON
SW1
SW1-SW2
SW2
SW3
SQ
ST-OFF
RX-DC
+13.8V
+13.8V
MIC
UL
CB-RX-VCC
JC1
13.8VDC
KEPC-504
KEPC-505

C75WX-ST THEORY OF OPERATION

PREPARED BY: ____________

CHECKED BY: ____________

APPROVED BY: ____________

ISSUE DATE : ____________

1. INTRODUCTION

1.1. Main Components list:

PLL IC AND LCD DISPLAY DRIVER (IC5-LC72322)
CRYSTAL (X2-4.5MHz)
VARICAP DIODE (KVD251S, D7 FOR CB MODE, D1 FOR WX MODE)
IF IC (IC1-DBL5018)
RX AUDIO AMP IC (IC6-LM386)
TX AUDIO AMP IC (IC2-TDA2003)
COMPANDER IC (IC3-TA31101AF)
SWITCH IC (IC4-MC4066) FOR COMPANDER CONTROL
RF POWER TRANSISTOR (Q25-2SC2078D)
LCD DISPLAY (LCD1)

2. PLL FREQUENCY SYNTHESIZER

2.1. REFERENCE FREQUENCY

The crystal, X2 (4.5 MHz) and other components at pins 1 and 80 of IC5 form an oscillator with an amplifier internal to IC5.

The oscillator output is internally fed to a divide by 1800 to produce a 2.5KHz square wave, which is the reference input to the phase detector.

2.2. FREQUENCY STABILITY

LET: Fo = Crystal Oscillator Frequency
Fr = Phase Detector Reference Frequency
Fvco = VCO Frequency
Ft = Transmit Frequency
Then Fr = Fo/ 1800

and under locked condition:

Fr = Fvco / N (Where N is the programmable divider ratio)

From which it can be seen that the percentage error in Ft is the same as the percentage error in Fo. The stability of the crystal oscillator is determined primarily by the crystal and to a lesser extent by the active and passive components of the oscillator. The choice of crystal and components is such that the required frequency stability is maintained under the required voltage and temperature range.

2.3. PHASE DETECTOR AND VCO CONTROL

The phase detector is a digital phase comparator which compares the leading edges of the reference with programmable divider output square waves and develops a series of pulses whose DC level depends on weather

the phase error is leading or lagging. The phase detector (pin 78 of IC5) output is fed to a charge pump and then to pin 78 of IC5. The low pass filter output at pin 78 of IC5 is filtered and fed to varicap D7 control the VCO frequency.

The result is second order PLL with loop dynamic a essentially controlled by the active low pass filter.

2.4. SWITCHING OF TUNING CAPACITOR IN VCO OSCILLATOR TANK CIRUIT

The VCO circuit must tune with a wide range of frequency 13.4825 MHz – 13.7025MHz for transmitter and 16.27 MHz – 16.710 MHz for receiver.

The use of one tuning capacitor in common has such adverse effects as a decrease in the tuning circuit and the occurrence of may spurious .To eliminate these effect, the tuning capacitance is switching for transmission of reception.

The tuning circuit consists of the primary of L10, C63, C64, C65, C67, becomes off so, the primary of L10 and mark tuning function. When transmitting, Q3 becomes on. So, the primary of L10 and the parallel capacitance of C66 make tuning function.

2.5. TRANSMIT DOUBLER

The Q22 output is obtained as base output and fed to base of double transistor Q28.

At this stage, the frequency is doubles .The Q28 output tank circuit is double tuning circuits (27 MHz) L11 and L12 to stop the 13.5 MHz frequency.

2.6. SWITCHING OF TUNING CAPACITOR IN VCO OSCILLATOR TANK CIRUIT

The VCO circuit must tune with a wide range of frequency 13.4825 MHz – 13.7025MHz for transmitter and 16.27 MHz – 16.710 MHz for receiver.

The use of one tuning capacitor in common has such adverse effects as a decrease in the tuning circuit and the occurrence of may spurious .To eliminate these effect, the tuning capacitance is switching for transmission of reception.

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2.7. RECEIVER LOCAL OSCILLATOR OUTPUTS

First mixer:

The secondary output of VCO tank circuit L10 is injected through buffer AMP Q18 and the buffer output through the bade of 1st mixer (Q12).

Second Mixer:

The output of 10.240MHz oscillator circuit with X1 is injected into the IF IC internally.

Incoming IF signal and 10.240MHz signal mixed inside the IF IC to extract 2nd IF signal 455KHz.

Audio signals are recovered with the way quadrature detector.

2.8. FAULT PROTECTION

IC5 included an auxiliatory exclusive or phase detector which functions as a lock detector. If locks is lost pin 11

bose low and the base pin of Q33 is cut off, to prohibit transmission. Transmission cannot be made if a code other then those for 40 channel is input to IC5.

3. RX , CB Receiver Section, 40 channels

RECEIVER

CB receiver is dual conversion supper-heterodyne type with the first IF10.695 MHz and the second IF 455KHz. Receiver is separated two blocks, 1st IF section and 2nd IF section. The PLL synthesizer supplies the first local frequency 16.270 – 16.71 MHz. With the provided first local frequencies Q12 mixes the incoming signals to generate first IF signal.

Mixed signals ware filtered with the CF1 (10.695 MHz) crystal filter and tuned circuits .

With the 10.240 MHz signals, IF IC (IC1) mixes the incoming signals to generate second IF signal.

Output signal of mixer were filtered with CF2 (455KHz filter) the 455KHz signals from the 2nd IF filter were amplified with IF IC101. After application the signals fed to the envelope detector circuit of IC1. Then could see the recovered signals. With the amplitude of recovered signals, it can be used as a AGC. With the swing of AGC IC2, Q11, D6 voltage all previous stages can be controlled that connection.

A SoundTracker switch controls the speech signal path of the microphone amplifier TR13. When the ST switch is set to ON, it cuts the TR13 output and directs it to a Compander chip IC3(TA31101AF) for speech signal dynamic range compressing. The output of IC3is then fed to IC2(TDA2003)for the remaining processing. When the ST switch is set to OFF, the compander function is turned off.

4. TX, Transmitter Section

4.1 RF AMPLIFICATION

The output of double AMP Q28 is fed through double tuning (27 MHz) L11, L12 to the base of RF AMP Q33. The output is then supplied through tuning circuit L13 to RF driver AMP Q29. The Q29 output is capacitance divided by tuning circuit L14 and C95 and passed through the base of final RF stage the Q30 output is supplies to the antenna through L - C tuning circuit.

4.2 CIRCUIT FOR SUPPRESSION OF SPURIOUS RADIATION

The tuning circuit between frequency synthesizer and final AMP Q33 and 3-stage “PI” Network, C99, C100, C102, C105, C103, C106, C104 in the Q30 output circuit server to suppress spurious radiation. This network serves to impedance n\match a Q30 to the antenna and to reduce content to acceptable levels. In the frequency synthesizer.

4.3 MODULATION

The MIC input is fed then to audio power AMP IC3 which feeds modulation transformer T1.

The audio output at the secondary of T1 is fed in series with the B+ voltage to the oscillator of driver Q29 and final Q30 to oscillator modulation both these stages.

4.4 CIRCUIT FOR LIMTING MODULATION

A portion of the modulating voltage is rectified by D11 which turns on Q24, Q25 which attenuates the MIC input to MIC AMP IC2.

The resulting feedback loop-keeps the modulation from exceeding 100 percent input approximately 40 dB greater than that required to produce-50 percent modulation.

4.5 Compander circuit

IC3 (TA31101AF) is the Compander which acts for compressing the dynamic range of the audio signal in the transmitting path, and expanding the dynamic range of the audio signal in the receiver path. This will result in an improved signal to noise

A SoundTracker key controls the speech signal path of the microphone. When the ST is set to ON, the speech signal directly to a compander IC3 (TA31101AF) for dynamic range compressing. Then output of IC3 is to IC2(TDA2003) for amplify processing. When the ST key is set to OFF, the compander function is off. the speech signal directly to audio amplifier IC2(TDA2003) not via to IC3 (TA31101AF) .

5. WX, Weather Band Receiver Section, 10 channels

Weather receiver is dual conversion super-heterodyne type with the first IF 10.695MHz and the second IF 455KHz. PLL supplies the local frequencies below 10.695MHz to convert 10.695MHz signals. Q7 amplifies the incoming weather signals. Q8 mixes the incoming weather signal and local to generate IF frequency possessing audio information. There stage 455KHz amplifier circuit IC1amplify the 455KHz signal to make enough level for discriminate the audio signal. IFT L9 and R41 are working as a FM detector.

THE IC & TRANSISTOR STATIC VOLTAGE FOR *CB 75WS2*

Ver : 00

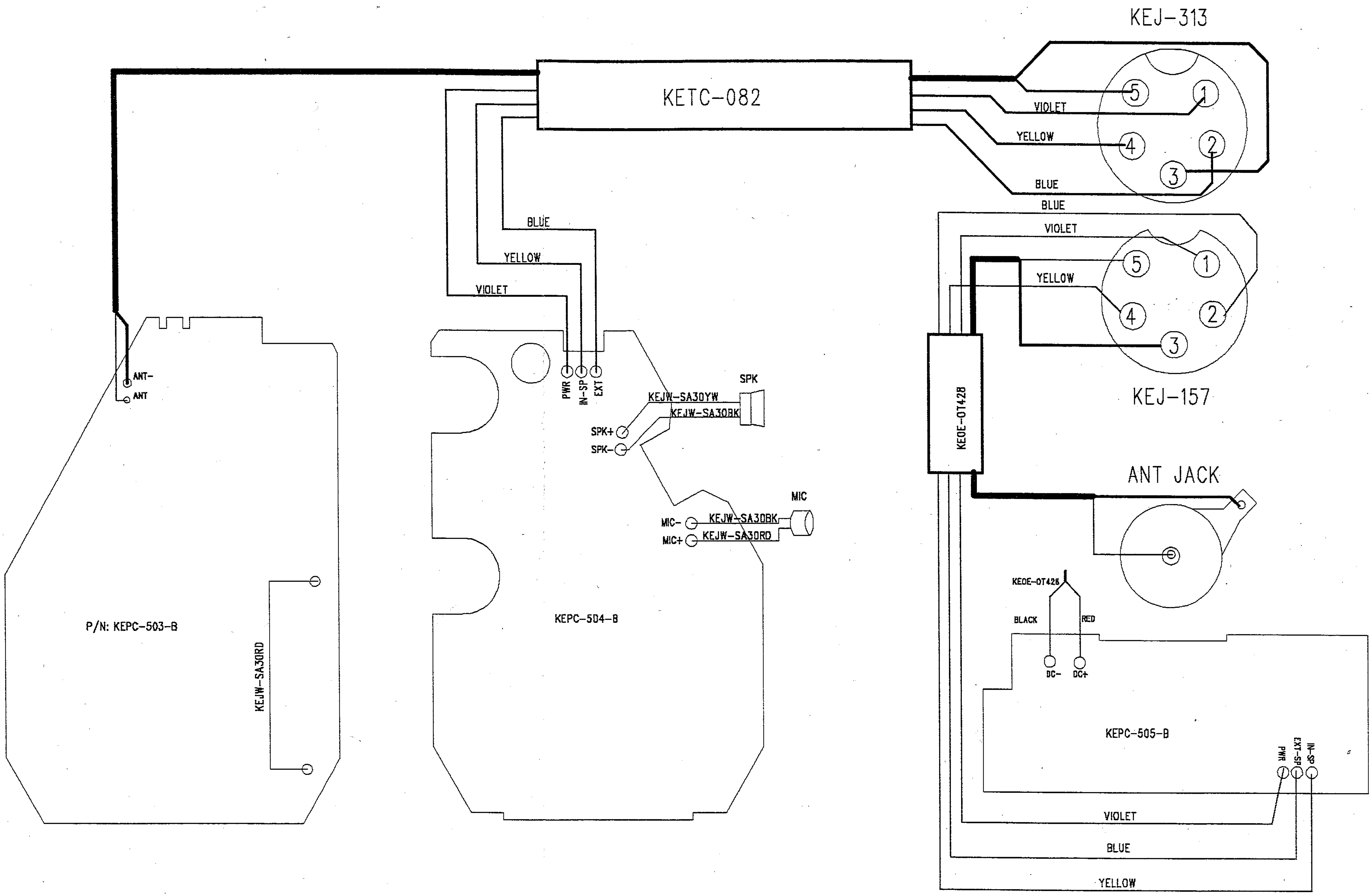
NO.	CB RX				CB TX				WX			
	Vb	Vc	Ve		Vb	Vc	Ve		Vb	Vc	Ve	
Q16	0.66	0.09	0									
Q7	1.12	5.1	0.23									
Q8	1.06	12.41	0.38									
Q32	1.11	4.39	0.38									
Q9	1.2	1.93	0.49									
Q17	1.92	13.68	1.21									
Q33	0.04	0.46	0.46									
Q12	2.26	2.72	1.62						2.05	3.02	1.42	
Q18	0.52	0.71	0									
Q15	0.71	0.01	0									
Q21	0	2.81	0									
Q28	4.54	5.23	5.28									
Q29	0.68	0.01	0									
Q22	2.03	4.36	1.37						0	4.43	0	
Q23	0	2.03	0						4.35	0	0	
Q13	0	0	0						0	0	0	
Q14	0.92	2	0.53						0.93	1.8	0.53	
Q19	0.53	2.01	0						0.54	1.8	0	
Q20	0.73	2.56	0						0.73	2.6	0	
Q34	0	7.02	0									
Q31	6.77	13.77	6.13									
Q30	6.1	0	6.13									
Q36	5.98	6.13	5.29									
Q35	5.7	13.69	5.08						5.72	13.48	5.19	
Q1									2.18	3.47	1.47	
Q3									0.69	2.61	0	
Q4									0.64	3.2	0	
Q5									1.04	3.59	0.35	
Q6									0.68	2.28	0	
Q2									4.36	4.42	3.63	
IC1 1				5.09								5.21
2				4.76								4.89
3				4.85								4.98
4				5.12								5.26
5				4.1								4.86
6				0.5								4.86
7				4.08								4.86
8				5.09								5.25
9				1.75								2
10				0								0
11				5								5.19
12				0								0
13				4.93								5.12
14				0								0
15				0								0
16				1.75								1.76
IC3 1				0.59								1.66
2				0.84								0.84
3				1.21								1.18

4				0								0
5				1.21								1.21
6				1.2								1.23
7				1.2								1.23

THE IC & TRANSISTOR STATIC VOLTAGE FOR ***CB 75WS2***

NO.	CB RX				CB TX				WX			
	Vb	Vc	Ve		Vb	Vc	Ve		Vb	Vc	Ve	
IC3 8				1.3								1.38
9				1.31								1.3
10				1.18								1.18
11				1.2								1.2
12				1.2								1.2
13				4.05								4.0
14				1.21								1.21
15				0.84								0.84
16				0.49								0.54
IC4 1				1.2								1.2
2				1.2								1.2
3				1.2								1.2
4				0								0
5				0.26								0.26
6				0.26								0.26
7				0								0
8				0								0.69
9				0								0
10				0								0
11				0								0
12				3.64								3.64
13				3.64								3.64
14				4.37								4.43
IC7 1				4.38								4.42
2				0								0
3				9.46								9.42
IC6 1				1.32								0.92
2				0								0
3				0.46								0
4				0								0
5				7.05								6.93
6				13.92								13.83
7				7.03								6.97
8				1.33								0.88
IC5 31				4.53								4.48
Q25					0.8	12.3	0					
Q26					0.2	11.5	0					
Q27					1.6	13	0.95					
Q11					1.45	5.5	0.8					
IC2 1								1.58				
2								0				
3								0.12				
4								6.2				
5								13.4				
Q30					5.36	5.97	6.1					

Q10					0	0	0					
Q24					1.84	0	2.45					
Q37					13.3	12.7	12.5					
Q38					5.6	0.05	0					



75WS2 WIRING DIAGRAM